

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1 – 18 (cancelled)

Claim 19 (new): A method of treating and reactivating a sorbent for use in capturing carbon dioxide in a fuel combustion process, wherein the combustion process is performed in a fluidized bed and generates carbon dioxide, and the sorbent comprises a calcinable alkaline earth metal, the method comprising

- (a) calcining the sorbent to form an alkaline earth metal oxide; and thereafter
- (b) introducing the alkaline earth metal oxide into a carbonator at a temperature of at least 600°C, and subjecting the alkaline earth metal oxide to carbon dioxide of a concentration of at least 85% to produce a carbonate of the alkaline earth metal;
- (c) transferring the alkaline earth metal carbonate into the fluidized bed;
- (d) calcining the alkaline earth metal carbonate to regenerate the alkaline earth metal oxide and carbon dioxide;
- (e) selectively removing the carbon dioxide produced in step (d); and
- (f) returning the alkaline earth metal oxide product of step (d) to the carbonator to capture carbon dioxide generated in the fuel combustion process; and thereafter
- (g) repeating steps (c) to (f) and selectively repeating step (b) between steps (f) and (c).

Claim 20 (new): The method as defined in claim 1, wherein the carbon dioxide produced in step (d) is pure carbon dioxide.

Claim 21 (new): The method as defined in claim 19, wherein step (b) further produces a residue comprising at least one of spent sorbent material and surplus carbon dioxide, and step (b) further comprises recovering the residue.

Claim 22 (new): The method as defined in claim 19, wherein the alkaline earth metal carbonate is limestone.

Claim 23 (new): The method as defined in claim 19, wherein the alkaline earth metal oxide is lime.

Claim 24 (new): The method as defined in claim 19, wherein the fluidized bed comprises a pressurized fluidized bed combustor (PFBC/C).

Claim 25 (new): The method as defined in claim 19, wherein the fluidized bed comprises a circulating fluidized bed combustor (CFBC/C).

Claim 26 (new): A method of treating and reactivating a sorbent for use in capturing carbon dioxide in a fuel combustion process, wherein the combustion process is performed in a fluidized bed and generates carbon dioxide, and the sorbent comprises a calcinable alkaline earth metal, the method comprising

- (a) calcining the sorbent in a first calciner to form an alkaline earth metal oxide;
- (b) treating the alkaline earth metal oxide in a hydration reactor to form an alkaline earth metal hydroxide;
- (c) carbonating the alkaline earth metal hydroxide at a temperature of at least 600°C and subjecting the alkaline earth metal hydroxide to carbon dioxide of a concentration of at least 85% to produce a carbonate of the alkaline earth metal and water;
- (d) transferring the alkaline earth metal carbonate into a second calciner and calcining the alkaline earth metal carbonate to regenerate the alkaline earth metal oxide and produce carbon dioxide;
- (e) introducing the alkaline earth metal oxide into a carbonator at a temperature of at least 600°C and subjecting the alkaline earth metal oxide to carbon dioxide of a concentration of at least 85% to produce a carbonate of the alkaline earth metal;
- (f) selectively removing the carbon dioxide produced in step (d);

(g) returning the alkaline earth metal oxide product of step (d) to the carbonator to capture carbon dioxide generated in the fuel combustion process; and thereafter
(h) repeating steps (b), (c), (d), (f) and (g), and selectively repeating step (e) between steps (f) and (g).

Claim 27 (new): The method as defined in claim 26, wherein step (e) further produces a residue comprising at least one of spent sorbent material and surplus carbon dioxide, and step (e) further comprises recovering the residue.

Claim 28 (new): The method as defined in claim 26, wherein the carbon dioxide produced in step (d) is pure carbon dioxide.

Claim 29 (new): The method as defined in claim 26, wherein step (b) is performed using liquid water or steam at a temperature greater than 50°C.

Claim 30 (new): The method as defined in claim 26, wherein step (c) and step (e) are each performed at a temperature in the range of 700°C to 1200°C.

Claim 31 (new): The method as defined in claim 29, wherein step (b) is performed at atmospheric pressure.

Claim 32 (new): The method as defined in claim 29, wherein step (b) is performed at a pressure greater than atmospheric pressure.

Claim 33 (new): The method as defined in claim 26 wherein the alkaline earth metal carbonate is limestone.

Claim 34 (new): The method as defined in claim 26, wherein the alkaline earth metal oxide is lime.

Claim 35 (new): The method as defined in claim 26, wherein the fluidized bed comprises a pressurized fluidized bed combustor (PFBC/C).

Claim 36 (new): The method as defined in claim 26, wherein the fluidized bed comprises a circulating fluidized bed combustor (CFBC/C).